

## -- HELPFUL HINTS --

### For Buying and Using Compact Fluorescent Lights (CFLs)

One of the best and easiest ways to reduce the amount of energy used for lighting our homes is to replace inefficient incandescent light bulbs with compact fluorescent lights (CFLs). Although CFLs are relatively expensive, they are a cost-effective investment due to their energy savings.

*However*, you may not be happy unless you understand how CFLs differ from the incandescent light bulbs that you are used to. This document will give you some basic information to help you make wise purchasing decisions. You can also find it on Bonneville Power Administration's website: [www.bpa.gov](http://www.bpa.gov).

#### Lighting Level

You are used to buying incandescent bulbs rated at a stated number of watts. The term "watt" refers to the amount of power that a device draws (the light bulb in this case). If a fixture is rated for so many watts, don't use higher wattage bulbs or you'll have a potential fire hazard on your hands. CFLs produce the same amount of light as incandescents for substantially less wattage.

The amount of light you get from a given bulb is measured in "lumens." Bulbs with the same lumen level produce the same amount of light, regardless of wattage. For the most part, you can assume that it takes 1/4<sup>th</sup> the amount of energy (wattage) to power a CFL as it does to power a comparable incandescent lamp.<sup>1</sup> (Note: Some conversion charts show equivalencies at lower lumen levels that are closer to a 1/2 ratio. The reason for the discrepancy is simply that lower wattage CFLs are not readily available in stores yet. In truth, a 13-watt CFL gives about twice the illumination of the 25-watt "equivalent" incandescent bulb.<sup>2</sup>) The following conversion chart shows a range of "equivalents" based on information that you'll see in various places.

<i>Incandescent</i>	<i>Lumen Output</i>	<i>Approximate Equivalent CFL Size</i>
25-watt	210 lumens	7 - 13 watt
40-watt	440-505 lumens	10 - 15 watt
60-watt	850-900 lumens	15 - 18 watt
75-watt	1150-1210 lumens	18 - 22 watt
100-watt	1670-1750 lumens	25 - 28 watt
150-watt	2600 lumens	37 - 39 watt

If you forget to take this guide to the store, simply pick up the appropriate size incandescent light bulb, note the lumen level, and then find a CFL with a similar lumen level (or simply use the 1/4 conversion factor). If need be, you can increase your lighting level by selecting the next larger size CFL than the rated equivalent and you should see better than you do now while still saving

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<sup>1</sup> U.S. Government Department of Energy and U.S. Environmental Protection Agency;  
<http://www.energystar.gov/products/cfls/>.

<sup>2</sup> Northwest Energy Efficiency Alliance; [www.nwalliance.org](http://www.nwalliance.org); Maker of the "Compact Fluorescent (CFL) Selection Guide."

energy and money! Note that you may want to opt for a higher-lumen CFL than the comparable equivalent for a few reasons:

1. CFL lumens decline over time (usage).<sup>3</sup>
2. CFL lumen levels are temperature dependent.<sup>4</sup> They produce less light if they are either too cold or too hot relative to their optimum operating temperature.
3. CFLs need up to 5 minutes to “warm up” to full illumination levels;<sup>5</sup> Energy Star qualified bulbs come up to full illumination within 3 minutes.<sup>6</sup>
4. CFLs give more diffuse light than do incandescent bulbs. Consequently, CFLs may not emit as much light as a comparable incandescent light bulb when used in a light fixture designed for an incandescent bulb;<sup>7</sup>
5. The position in which the CFL is operated may affect lighting levels. CFLs that are operated “base down” may give less light than those that are operated “base up.”<sup>8</sup> The Energy Star specification is based on the lumen level associated with the position that yields the least amount of light.<sup>9</sup>
6. The type of CFL affects light output. Broad-spectrum CFLs produce less light than standard CFLs.<sup>10</sup>

### CFL Fit in Existing Fixtures – Considerations and Tips

Fit is the biggest problem with CFLs. They are almost universally larger than incandescent lights – at least at this time. A few manufacturers make “sub-CFLs” which have a *much better (but not 100%)* chance of fitting in a confined space than regular CFLs. Although sub-CFLs are still relatively rare, you can find them by doing an Internet search. Big “home centers” often have a large selection of CFLs and will likely have at least some sub-CFLs. **In either case, make sure they are labeled as Energy Star to ensure the best quality and savings.**

Before you buy a CFL, check out the fixtures in your home to see if you can install a bigger bulb than the existing one. Be advised that one of the biggest fit problems with CFLs (at least if you’re using sub-CFLs) is the “neck” of the bulb. With a CFL, the ballast (the starting device) is placed at the neck, so the neck is much fatter than that of an incandescent bulb. In some fixtures, the larger diameter neck will prevent you from screwing the bulb into the socket.

The easiest fixtures to fit are those that are the most open. Hanging lamps with a large shade covering a single bulb are ideal and should accept most any bulb-shaped CFL. Some can even

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<sup>3</sup> See “CFL Specifications” (Adobe file) under <http://www.energystar.gov/products/cfls>; “Energy Star® Compact Fluorescent Lamp Specification; p.3. Lumen levels at 40% of rated life must be at least 80% of what they were initially.

<sup>4</sup> Goldwasser, Samuel M.; Sam’s F-Lamp FAQ; “Why Fluorescent Lamps are Sometimes Dimmer than Expected?”; <http://www.misty.com/people/don/f-lamp.html>; p 22; 4/27/01.

<sup>5</sup> Lawrence Berkley National Laboratory; Lighting Systems Research Group Facilities; “Why are CFLs so dim at first?” <http://eande.lbl.gov/BTP/CFLQ&A.html>; p.3; 5/18/01.

<sup>6</sup> See “CFL Specifications” (Adobe file) under <http://www.energystar.gov/products/cfls>; “Energy Star® Compact Fluorescent Lamp Specification; p.3.

<sup>7</sup> Audin, Lindsay; “Screw-In Dimmable Compact-Fluorescent Lamps: Finally a Reality”; Lighting Technology; 11/98.

<sup>8</sup> “Consumer Reports;” “Compact fluorescents *come of age*,” January 1999, p. 36.

<sup>9</sup> See “CFL Specifications” under <http://www.energystar.gov/products/cfls>; “Energy Star® Compact Fluorescent Lamp Specification; p.3.

<sup>10</sup> Klipstein, Don; Light Bulb, Lighting Fixture and Lamp Troubleshooting;” “Light Output and Color Problems: Fluorescent Lamps Look Dim;” <http://www.misty.com/people/don/ltrouble.html>; “p.7; 4/27/01.

take circular CFLs. Desk lamps can generally accept a CFL if the bulb hangs vertically (though bulb length can be an issue).

The most difficult fixtures to convert to CFLs are those that are enclosed (for example ceiling fixtures with a small globe) and those that have a narrow “harp” (the part of a lamp that holds the shade). To fit a bulb to a lamp with a harp, remove the shade, hold the lamp sideways and trace the harp on a piece of paper. (You may need a second pair of hands for this task.) Take the tracing to the store, and find a CFL that can fit completely within the outline of the harp. Also be sure to verify that the bulb still fits within the outline if you lower the bulb to the spot where it would be located once it is screwed into the lamp socket. (Some harps have a narrow base that would preclude the use of a CFL that would otherwise fit.)

If you can’t find a CFL that works, you have three options:

- (1) buy a bigger harp or a harp “extender” that widens the base,
- (2) buy a ceramic screw-in extender that will elevate the bulb, or
- (3) wait for a smaller bulb to hit the market.

Lamp stores should be able to help you find the right harp, and hardware stores should have the ceramic “extender.” The energy savings will make it financially worthwhile – although the payback period won’t be quite as fast as it would otherwise be.

For floodlights, you may need a ceramic “extender” that will make the narrow part of the CFL’s neck just a bit longer. Some standard floodlight sockets are sufficiently recessed that they cannot accept the CFL without the extender. (The ballast makes the CFL neck wider than the neck of an ordinary incandescent floodlight.)

Also be advised that CFLs come in many shapes – some of them quite strange. You will want to go to the store knowing if you need a standard looking bulb or whether a “twist” shape or circular tube would work. The odd looking bulbs are actually rather fun and they can give off more light in terms of lumens/watt than their “normal looking” cousins. Be sure to look at the base of the bulb to ascertain if the bulb you picked up is a replacement for an incandescent or whether it is a “dedicated” CFL. Light bulbs for “hard wired” fixtures aren’t screwed in; rather they have press-fit connectors or they twist into place.

### **CFL Color**

Not all CFLs show the true color(s) of illuminated objects, and the bulbs themselves may look different from the incandescent bulbs you’re used to. Your best bet is to look for a display in the store where you can see the bulb of your choice lit up. If the store doesn’t have one, make your selection and ask an employee for a demonstration.

You’ll probably have better luck with this request if you are buying from a home center than if you pick up your bulb in the grocery store. See if the color of the bulb is pleasing to your eye. If the colors seem true or at least they’re good enough for you, you’ve got a winner in the color category.

Although you may be initially drawn to the yellower CFLs that look more like incandescent bulbs, you may discover that the whiter (bluer) color bulbs are more pleasing than you might have initially expected. Allow yourself to experiment with various colors.

## Other Considerations

Unfortunately, CFLs are not as versatile as incandescents – at least not yet. The way light is produced in CFLs is totally different from the way light is produced in incandescent lamps.<sup>11</sup> Thus with a regular CFL, the bulb must be used in a dry indoor location *without any* of the electrical complexities listed below (unless otherwise noted). You can, however, buy specialty CFLs for specialty applications. For some of the situations described below, you'll have to find a local store with an unusually wide selection or you'll have to special order what you need through the store or over the Internet.

Identify whether any of the lighting complexities listed below apply to you. If so, read the notes to help you determine what to do. **Many of the identified risks are based on limited information and probably do not represent serious problems.** However, because BPA would prefer to err on the side of caution, potential risks that have been identified in the literature are reported below. By far the biggest risk that you really face is premature failure of your CFL.

#	Situation	Yes	No	Notes
a.	Use with a dimmer	<input type="checkbox"/>	<input type="checkbox"/>	Dimmable CFLs are commonly available and are generally clearly marked as such on the packaging. Regular CFLs may not work with a dimmer and could be a fire hazard <sup>12</sup> – even if you operate the circuit at full brightness. <sup>13</sup> One manufacturer states that dimmers must be wired on “hot” (black wire) and must have been manufactured after 1/1/90. <sup>14</sup> Test dimmable CFLs for flicker and starting problems at the lowest settings, “buzz” and “hum” sounds, and dimmer heat-up. <sup>15</sup> Flickering can be a fire hazard. <sup>16</sup> CFLs generally dim only to 10-20% of light output <sup>17</sup> which may be too much light for some uses. Check to see if you need a special fluorescent dimmer; <sup>18</sup> if you can use a standard incandescent dimmer, the package will say so.

<sup>11</sup> <http://www.lightingresource.com/advancetransformer/glossary.asp>; 5/7/01. Defines a fluorescent lamp as “Gas filled lamp in which light is produced by the interaction of electrons with phosphors lining the lamp’s glass tube.” Defines an incandescent lamp as “Lamp in which light is produced by a filament heated by an electric current.”

<sup>12</sup> Audin, Lindsay; “Screw-In Dimmable Compact-Fluorescent Lamps: Finally a Reality”; Lighting Technology; 11/98, p. 161.

<sup>13</sup> Energy Outlet; “Lighting Controls and Compact Fluorescent Lamps;” <http://www.energyoutlet.com/res/lighting/controls>; 5/10/01.

<sup>14</sup> See instructions for TCP “Spring Lamp” Dimmable CFL.

<sup>15</sup> Audin, Lindsay; “Screw-In Dimmable Compact-Fluorescent Lamps: Finally a Reality”; Lighting Technology; 11/98.

<sup>16</sup> Klipstein, Don; “Light Bulb, Lighting Fixture and Lamp Trouble shooting;” [www.misty.com/people/don/trouble.html](http://www.misty.com/people/don/trouble.html); p.2; 4/27/01. Reference is actually related to incandescent lamps but may apply to CFLs as well.

<sup>17</sup> Audin, Lindsay; “Screw-In Dimmable Compact-Fluorescent Lamps: Finally a Reality”; Lighting Technology; 11/98.

<sup>18</sup> Goldwasser, Samuel M.; Sam’s F-Lamp FAQ; “Compact Fluorecent Lamps;” <http://www.misty.com/people/don/f-lamp.html>; bullet #5; p. 18; 4/27/01.

#	Situation	Yes	No	Notes
b.	3-way bulb needed	<input type="checkbox"/>	<input type="checkbox"/>	A regular CFL may fail in a 3-way fixture. <sup>19</sup> Three-way CFLs are hard to find, but do exist. If you want one, it may be best to try the Internet or a home center (as it will be more likely than most stores to have a large inventory of CFLs). A 3-way CFL in a regular fixture will operate only at the highest setting <sup>20</sup> (and it's safe).
c.	Enclosed fixture	<input type="checkbox"/>	<input type="checkbox"/>	CFLs should be rated for use within an enclosed fixture. Read the fine print on the package. Assume you must have airflow unless otherwise stated. <sup>21</sup> The danger is CFL overheating. The probable effect is premature CFL failure. Fire hazard is a remote possibility. Several manufacturers explicitly tell you not to use their CFLs in an enclosed fixture, but don't assume that the absence of a warning makes it ok.
d.	Recessed can lights	<input type="checkbox"/>	<input type="checkbox"/>	Heat build-up can be a real problem for CFLs, so be sure that the product is rated for use in recessed cans. One author reports that the ballast could "short out" and the CFL could be a fire hazard. <sup>22</sup>
e.	Outdoor location	<input type="checkbox"/>	<input type="checkbox"/>	The problem with using a regular CFL outside in a dry location is that cold weather reduces light output. <sup>23</sup> The CFL may operate "erratically" unless the bulb is rated for the temperature in your area. <sup>24</sup> Low temperature CFLs are advertised on the Internet and are generally available from home centers. Enclosed fixtures are often recommended to counter the effects of cold weather, but this could be a problem in the summer if it stays warm at night <sup>25</sup> (see issues related to enclosed fixtures). GE warns of risk of electric shock if its Genura light bulb is operated below 32°F. <sup>26</sup>
f.	Wet conditions (rain / bath)	<input type="checkbox"/>	<input type="checkbox"/>	It can be hard to find CFLs capable of withstanding water – whether actual rain or just water vapor (like you'd find in a bathroom). Try the Internet or home center if need be. TCP claims to have made the "first wet location CFL." <sup>27</sup> Using a regular CFL will likely result in premature failure if water droplets touch the bulb. There's a potential risk of electric shock if the bulb is exposed directly to water. <sup>28</sup> Encapsulated bulbs are best for this application.

<sup>19</sup> Lawrence Berkley National Laboratory; <http://eande.lbl.gov/BTP/CFLQ&A.html>; 5/18/01.

<sup>20</sup> Technical Consumer Products; "The Dimmable SpringLamp... Answers to your most frequent questions!"

<sup>21</sup> For example, the Panasonic "Gen IV Light Capsule" lists potential uses on the back of the package and includes in that list "Totally Enclosed Fixture." Some lamps may be safe in enclosed fixtures and not say so, but use discretion. Better yet, check with the manufacturer if the product does not tell you.

<sup>22</sup> Klipstein, Don; "Some Better Compact Fluorescent Lamps;" "Compact Fluorescent Lamp Recommendations;" "Phillips SLS 15 and 20 watt R30 and R40 floodlights!" <http://www.misty.com/people/don/cfbest.html>; p.5; 4/27/01.

<sup>23</sup> <http://www.eren.doe.gov/consumerinfo/refbriefs/ef2.html>; 6/11/01.

<sup>24</sup> Klipstein, Don; "Compact Fluorescent Lamps;" "Compact Fluorescent Lamp Basics and Pitfalls;" <http://www.misty.com/people/don/cf.html>; p.2; 4/27/01.

<sup>25</sup> Goldwasser, Samuel M; Sam's F-Lamp FAQ;" "Compact Fluorescent Lamps;" "Fluorescent Lamps, Ballasts, and Fixtures;" <http://www.misty.com/people/don/f-lamp.html>; p.18; 4/27/01.

<sup>26</sup> Warning label on box for GE's Warm White "Genura" CFL.

<sup>27</sup> TCP catalog; "Wet Location SpringLamp;" (UL listed and can be directly exposed to the weather); catalog #CF-20k (?); no date or other identifying characteristic.

#	Situation	Yes	No	Notes
g.	Used with photocell	<input type="checkbox"/>	<input type="checkbox"/>	The photocell must be CFL rated. If the CFL is not rated for use with a photocell, it will likely fail prematurely or it could be a fire hazard. <sup>29</sup> CFLs with an integrated photocell are available on the Internet. Some CFLs require a photocell rated for CFL use. However, at least one manufacturer (TCP) makes a CFL that can be used with a photocell designed for incandescent lights. <sup>30</sup> Unless otherwise indicated, you need a photocell rated for fluorescent lights or “inductive loads.” <sup>31</sup>
h.	Used with timer	<input type="checkbox"/>	<input type="checkbox"/>	You may use a CFL with a mechanical ( <i>but not electronic</i> ) timer. If you don’t know, ask an expert or don’t do it. Electronic timers may interfere with the CFL’s electronics causing premature failure of either the CFL or the timer. <sup>32</sup> The problem is the electronic ballast used with a CFL. If you have an electronic timer, buy a CFL with a <i>magnetic</i> ballast. <sup>33</sup>
i.	On 3-way circuit	<input type="checkbox"/>	<input type="checkbox"/>	CFLs placed in a 3-way circuit (which allows you to turn on lights from more than one location) should work fine.
j.	On motion detector	<input type="checkbox"/>	<input type="checkbox"/>	CFLs work fine with motion detectors, but lights on motion detectors are vulnerable to being turned on and off frequently – a bad thing for CFL longevity. It’s probably best <i>not</i> to combine a CFL and a motion detector especially if the light is outside (where it’s colder). Quartz halogen lamps are a better alternative.
k.	Electronic interference	<input type="checkbox"/>	<input type="checkbox"/>	CFL ballasts can cause electronic interference. <sup>34</sup> The FCC requires protection devices on CFLs, <sup>35</sup> but they are not all equal in quality. If you have a problem, put physical distance between the CFL and the electronic gear and make sure that the CFL is on a different circuit than the electronics. Interference can occur with remote controls (TV, VCR, stereo), AM radios, cordless phones. <sup>36</sup>
l.	Grounding	<input type="checkbox"/>	<input type="checkbox"/>	CFLs should be used only on a “grounded” circuit. <sup>37</sup> (These circuits will either have a “three-prong” outlet or one of the two prongs will be larger than the other.

<sup>28</sup> Warning label on the carton of the Panasonic “Gen IV Light Capsule.”

<sup>29</sup> Energy Outlet; “Lighting Controls and Compact Fluorescent Lamps;” <http://www.energyoutlet.com/res/lighting/controls>; 6/8/01.

<sup>30</sup> Label on TCP SpringLamp.

<sup>31</sup> Energy Outlet; “Lighting Controls and Compact Fluorescent Lamps;” <http://www.energyoutlet.com/res/lighting/controls>; 6/8/01.

<sup>32</sup> Energy Outlet; “Lighting Controls and Compact Fluorescent Lamps;” <http://www.energyoutlet.com/res/lighting/controls>; 6/8/01.

<sup>33</sup> Energy Outlet; “Lighting Controls and Compact Fluorescent Lamps;” <http://www.energyoutlet.com/res/lighting/controls>; 6/8/01.

<sup>34</sup> Klipstein, Don; “Compact Fluorescent Lamps;” “Fluorescent Lamps, Ballasts, and Fixtures;” <http://www.misty.com/people/don/f-lamp.html>; p.7; 4/27/01. Citation gives explanation for electronic interference as reported in the Consumer Reports article, “Compact fluorescents *come of age*,” January 1999.

<sup>35</sup> See “CFL Specifications” (Adobe file) under <http://www.energystar.gov/products/cfls>; “Energy Star® Compact Fluorescent Lamp Specification; p.3.

<sup>36</sup> “Consumer Reports;” “Compact fluorescents come of age;” January 1999, p. 36.

<sup>37</sup> Goldwasser, Samuel M.; “Sam’s F-Lamp FAQ;” “Why is a Grounded Fixture Needed for Reliable Starting?”; <http://www.misty.com/people/don/f-lamp.html>; pp. 20-21; 4/27/01.

#	Situation	Yes	No	Notes
m.	Starting	<input type="checkbox"/>	<input type="checkbox"/>	Look for an “instant on” bulb which will start as quickly as an incandescent. <sup>38</sup> “Rapid start” is the next best option, but will take a second or two to light. <sup>39</sup> The rate at which the light will come to full illumination levels will vary. <a href="#">Energy Star bulbs start within one second, and come to full illumination level within three minutes.</a> <sup>40</sup>
n.	Special design needed	<input type="checkbox"/>	<input type="checkbox"/>	Most specialty CFLs (like “candle” lights or a larger-than-normal screw base) must be purchased over the Internet and may not be Energy Star qualified. CFL flood lights come in two basic designs – a bulb somewhat resembling an incandescent flood and a replaceable CFL encased in a housing that looks like a flood. CFL floods are starting to appear in stores.
o.	Safety concerns	<input type="checkbox"/>	<input type="checkbox"/>	If you are concerned about safety, check the label to make sure you are buying a CFL that has been tested by Underwriter’s Laboratory (UL).

### Best and Worst Locations for CFLs

- Use CFLs primarily in areas where lights are needed for at least 15 minutes after being turned on.<sup>41</sup>
- Use CFLs in hard-to-reach places because they last up to 10 times longer than incandescent lights.<sup>42</sup> Therefore, you won’t have to make as many trips up the ladder.
- Interestingly, CFLs work best if they are used relatively often.<sup>43</sup> Frequent switching of CFLs shortens their lives, so you want to avoid installing CFLs in spots where you typically need them on only for a minute or two.
- Don’t use CFLs if the temperature is really cold (unless they are rated for it) because they won’t light quickly, have trouble coming up to full illumination, and may burn out sooner.
- Be judicious about placing CFLs in entryways – you don’t want to come home late at night, flick the switch, and then have to wait for the light to come on. Energy Star products should alleviate this problem.
- When making a CFL purchase, look for “instant on” or Energy Star CFLs.
- Don’t tempt fate by using CFLs in places where they are not supposed to be used (e.g. in wet locations, on electronic timers, etc.).
- And finally, keep CFLs away from electronic equipment if you notice interference.

<sup>38</sup> “Consumer Reports;” “Compact fluorescents come of age;” January 1999, p. 36.

<sup>39</sup> <http://www.lightingresource.com/advancetransformer/glossary.asp>; 5/7/01; Rapid Start requires preheating of lamp filaments while instant start is based on a high voltage input that obviates the need for preheating.

<sup>40</sup> See “CFL Specifications” (Adobe file) under <http://www.energystar.gov/products/cfls>; “Energy Star® Compact Fluorescent Lamp Specification; p.3.

<sup>41</sup> Klipstein, Don; “Compact Fluorescent Lamp Basics and Pitfalls;”

<http://www.misty.com/people/don/cf.html>; bullet #15; p.2; 4/27/01.

<sup>42</sup> U.S. Government Department of Energy and U.S. Environmental Protection Agency; <http://www.energystar.gov/save.shtml>.

<sup>43</sup> Lawrence Berkley National Laboratory; Lighting Systems Research Group Facilities; “Why are CFLs so dim at first?” <http://eande.lbl.gov/BTP/CFLQ&A.html>; p.3; 5/18/01.



## Operating Problems

For the most part CFLs work well, but older versions and non-Energy Star products may flicker, hum, or start poorly (slow to light and slow to reach full illumination levels).<sup>44</sup> These problems are more likely to occur in dimmable CFLs because their technology is more complicated than ordinary CFLs.

If you notice a problem when the CFLs are new, your best bet is to return the poor performing bulbs to the store and buy a different brand or at least a different model. (This is a hint to take the time to check out your new purchases right away.)

If you discover the problem too late to exchange the poor performing CFLs, try moving them to places where their flaws are less conspicuous. For example, a CFL that hums is unlikely to be a problem in a closet; color rendition is not a particular problem for a porch light.

Even if the CFL dies early because the location is not ideal, you're still saving energy relative to using an incandescent light bulb. **If you are concerned about bulb life and quality, buy only Energy Star labeled products – then save the receipt and applicable packaging.**

## Internet Shopping Tips

Generally there is better information about CFLs on the Internet than in stores and you'll have a wider product selection. That being said, fit and color are the big question marks here.

Colors look more natural when viewed under lights with a relatively high "color rendition index" (CRI). Look for a bulb with a "CRI" rating in the mid-eighties or above. **Energy Star lamps are required to be above 80 CRI, and most are better than that.** Triphosphor bulbs have CRIs greater than 80. For reference, incandescent lights typically have a CRI of 95+.

With respect to the color emitted by the light bulb itself, you should pick a bulb with a color temperature rating of 2700-3100° K if you like the "incandescent look." Higher color temperatures cast a bluish hue while lower color temperatures look yellowish or pinkish, depending on the manufacturer. Energy Star requires that a bulb outside the 2700 –3100 range be clearly marked.

Good keywords/phrases to try with search engines include: CFL, "compact fluorescent", "sub-CFL", "lighting", "lighting distributor", and "lamp". Of course, as is true in other industries, many of the manufacturers' products are sold by third parties under a private label.

## General Notes

The technology for CFLs is rapidly evolving. **In terms of reliability, you probably can't go wrong with a bulb from companies with the largest number of Energy Star rated CFLs.** While known brands are a good way to go, be advised that you may find innovative lamp designs that you prefer in the product lines of other CFL manufacturers. You can get a list of all currently-approved Energy Star companies on the Federal government website: <http://www.energystar.gov/>. CFL manufacturers who are not listed under the Energy Star label

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<sup>44</sup> Audin, Lindsay; "Screw-In Dimmable Compact-Fluorescent Lamps: Finally a Reality"; Lighting Technology; 11/98.



may produce a fine product that simply has not been independently tested *or* they may have been removed from the program because their products didn't measure up. Be advised.

If you have a difficult lamping situation, the top manufacturers of CFLs with Energy Star ratings have identified some of their special application bulbs. You'll probably find something that meets your needs. Note that many of the bulbs on a manufacturer's website are *not* Energy Star approved.

As in most any business, some companies have trouble with maintaining quality control. This problem is being addressed. BPA, the NW Energy Efficiency Alliance and other stakeholders in the US are beginning to conduct reliability and quality tests with "off-the-shelf" light bulbs rather than using manufacturer-provided sample products. These independent tests are designed to ensure that Energy Star labeled products continue to meet the standards set.

You will find variability among products. Quality control is improving, but you may notice some color variation even among products that are supposedly identical (same brand, same model).<sup>45</sup> The reason for this is that the rare earth phosphors used in manufacturing the CFLs are naturally variable; just like tile, rock, or anything else from the earth.

New products are being tested and released constantly as consumers ask for better, smaller, more versatile products. We hope that your experience is rewarding, and we expect that your next one will be even better.

While it's true that CFLs are more complicated than incandescent light bulbs in terms of electrical characteristics, remember the bottom line.

**SAVE ENERGY,**

**SAVE MONEY,**

**GO CFL!**

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<sup>45</sup> Klipstein, Don; "Troubleshooting Light Bulbs, Light Fixtures, and Lamps;" "Fluorescent Bulbs Look Different in Color;" <http://www.misty.com/people/don/ltrouble.html>; p. 8; 4/27/01.